

# GEOLOGY *at SMU*

An occasional newsletter for alumni and friends. October 2002

## ***Survey of graduates shows:*** **Geology is always a good bet!**

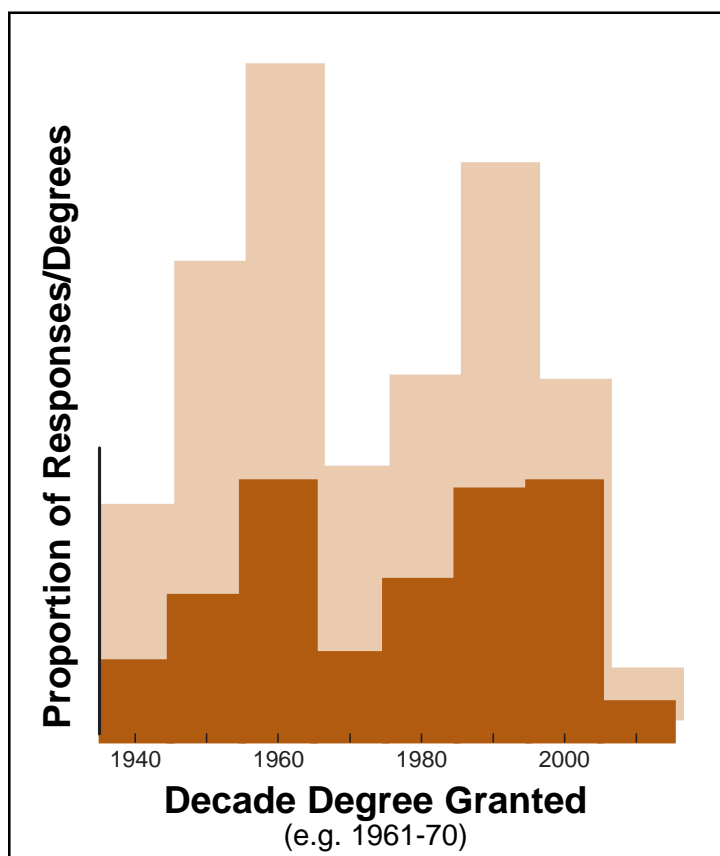
Our summer alumni survey showed the importance of career opportunities in oil and gas exploration to our graduates while illustrating the success of our graduates who choose to pursue careers in research and education. After receiving several questions about the job market in geology, we sent out approximately 600 questionnaires using our active mailing list to gather data on career paths of our alumni. The responses came in over the summer from alumni from every decade starting with the 1930's. The number of responses from each decade mimicked the total number of degrees granted in that decade; the total responses exceeded 25%.

While SMU was founded in 1911, the first earth science degree was granted in 1920. The master's degree program was started after World War II and the Ph.D. program granted its first degree in 1967 (see page 3). The registrar tells us that 735 people have earned degrees in earth science at SMU. This averages out to roughly 9 degree holders per year. The maximum number of degrees granted (37) occurred with the class 1949, probably the result of the GI bill and the attractiveness of geology in Texas.

As a group of Texas graduates, it is not surprising that the participation rate has been and continues to be high in the petroleum industry. To the present, it appears to be highest among holders of the bachelor of arts degree, decreasing to about 10% at the Ph.D. level (lower right page 3). However, even during the heights of the oil booms, our graduates have been active in research, education, and business (lower right page 5). Before 1980, more than half of the bachelor's and master's degree holders *did not go* into the petroleum industry. At the same time, the largest segment of our 1990's degree holder population still participates in some aspect of the petroleum industry.

As a department, there has been wonderful continuity with some of the faculty starting with the late Claude Albritton and continuing to the present with Gene Herrin, David Blackwell and Lee McAlester. Emeritus faculty Jim Brooks, Bob Laury and Mike Holdaway also were involved in the department for a good portion of its history. Nevertheless, in reading through the responses, it is interesting to get perspectives from people who spent time at SMU on their way to other things. The accomplishments are impressive.

Approximately 50 % of the respondents completed degrees beyond their SMU degrees. Some have gone onto medicine and law in addition to completing higher degrees in earth science. There



are also CEO's, a former ambassador, an airline pilot, a *New York Times* best-selling author, an emergency room physician, an FBI agent, a few deans and a university president among the group.

The greatest compliment that a department receives is the contact it has with its alumni. Many of you commented on your interactions with the late faculty, Claude Albritton and Art Richards. The field studies course in New Mexico clearly left an indelible impression on some. Field experiences continue to be an important part of the program. The survey responses support our move to better integrate our use of computers in the curriculum. Many of you suggested the need for some exposure to business courses for geology majors. We will be working with the Cox Dean's Office to come up with a list of appropriate courses of interest to earth scientists.

*See additional graphs on Pages 3 and 5.*

## Chairman's Report

# Seismology and cosmology now linked

By Robert Gregory

As our alumni survey indicates, geology is a very practical science that plays an important role in our economy and helps maintain our way of life. There is also a rich tradition in geology regarding grand questions relating to our existence. For many years, geochemists have been measuring meteorites and making inferences about the origin of the elements, the age of the universe, and the formation of the solar system. Until now, cosmological issues have not been addressed by the here and now field of seismology.

A team of scientists from SMU's Geological Sciences and Physics has changed this by using the entire earth as a detector to test a hypothesis about the existence of a type of strange dark matter. Nobel laureate Sheldon Glashow suggested that a form of matter called a quark nugget moving at galactic speed could generate seismic waves as it passed through the earth. Vic Teplitz of the Physics Department approached seismologist Gene Herrin about the possibility of using seismology to detect quark nuggets. Herrin and Teplitz wrote a paper in *Physical Review* published in 1996 where they laid out a program for identifying seismic events that would be consistent with the passage of this type of matter.

In the search for the fundamental building blocks of matter, protons and neutrons are now thought to be collections of 3 truly fundamental particles called quarks. The mass of a typical nuclear particle (3 quarks) is about 1 amu or  $1.67 \times 10^{-27}$  kg. Some theories suggest that under some circumstances, nearly electrically neutral collections of quarks could grow to masses on the order of tons.

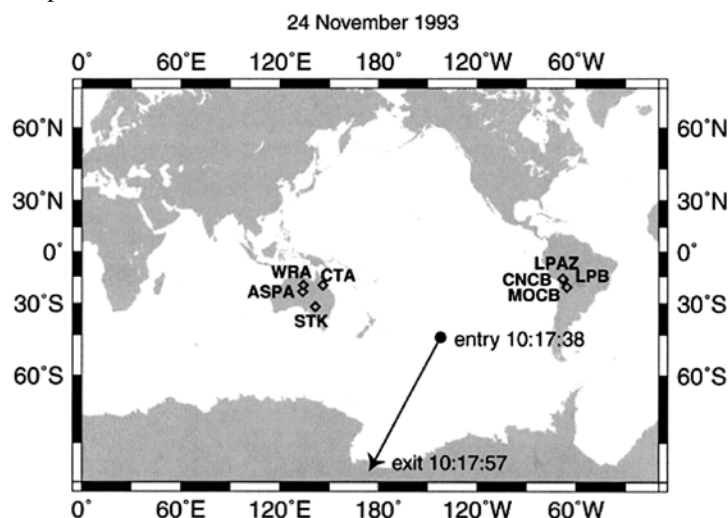
These micron-scale quark balls travelling at galactic speeds (250 km/sec) could generate detectable earthquakes. Because galactic relative velocities are so large compared to seismic waves or the velocity at which fault breaks grow, these quark nuggets would generate earthquakes for which there would be no epicenter, i.e. seismic waves would be generated along the entire path through the earth. The waves would appear to come from the direction of closest approach of particle to the station.

In order to find events that met the criteria, Herrin realized that they would need a catalogue of "unassociated" events. In this context, "unassociated" means that a station reported an earthquake for which, on the basis of later analysis, was not associated with epicentral events observed by other stations. The US Geological Survey was the only data repository that had such a catalogue. However, there was a problem: the tapes of the records were

stored in a format no longer in use by the survey. SMU's David Anderson figured out how to read the tapes and then began sorting through all of the data. Early on they realized that some of these nuggets would pass through the lower mantle, a place not normally deemed to be a source of earthquakes.

Ileana Tibuleac (Ph.D., 1998) generated new travel time curves for the lower mantle.

With the key elements in place, the group sorted through the 38,000 best candidates for 1993 from a thirteen year list of approximately 3 million events. Out of the 38,000 best candidates, two events could not be eliminated, one of which is shown plotted on a world map below.



In what may be a major discovery, the number of events is consistent with the number suggested by Herrin and Teplitz in their 1996 paper. The existence of dark matter has been inferred to account for the velocity distribution of stars within galaxies and to satisfy some theories on the large scale structure of the universe. The problem has been to find a way to directly detect a form of matter that leaves little or no electromagnetic signature.

In a paper deposited on the Los Alamos physics website, the team reported evidence for the passage of two exotic particles through the earth. The paper is currently under review by the *Bulletin of the Seismological Society of America*. The internet link to the paper is at <http://www.geology.smu.edu>.

## SMU alumni Grammer, Yeilding chosen for 2002-2003 AAPG Distinguished Lecture

Alumni Michael Grammer (M.S., '83) and Cindy Yeilding (B.S., '82) share the honor of being a part of the 2002-2003 AAPG Distinguished Lecture Series.

Grammer is an associate professor of geology at Western Michigan University. His lecture topic is *Predicting the Distribution & Geometry of Platform Carbonate Reservoirs - Insights from the Integration of Modern & Outcrop Analogs*.

Yeilding works for British Petroleum in Houston, Texas. Her lecture topic is *The History of a New Play: Thunder Horse Discovery, Deepwater Gulf of Mexico*.

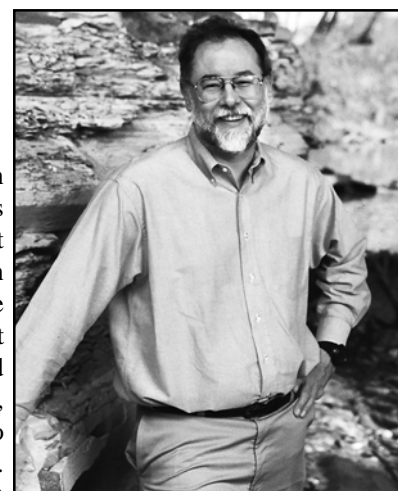


Photo by Hillsman S. Jackson

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## Charles W. Naeser - First among graduating PhDs

# SMU Geology grad distinguished himself at USGS

By James Brooks  
Professor Emeritus

Chuck Naeser rode the crest of the first wave of graduate students in the Ph.D. program in Geological Sciences at SMU. He arrived at SMU after completing A.B. and M.A. degrees in geology at Dartmouth College, the latter in 1964.

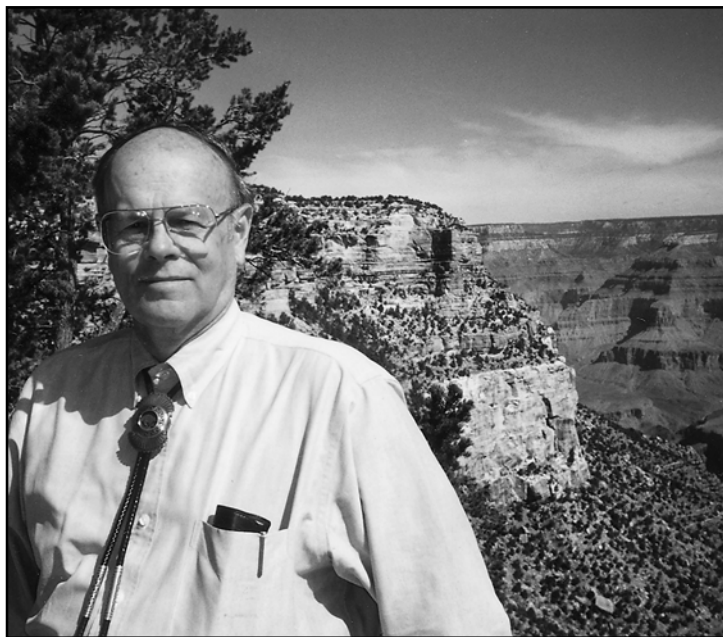
SMU had a very strong M.S. degree program for many years but following the creation of the Southwest Center for Advanced Studies by GSI-TI Founders, Jonsson, Green and McDermott, faculty strength available for graduate studies was greatly increased. In the geological sciences, for example, a very strong group of faculty headed by Anton Hales included geochronologist Henry Faul.

The combined Geological Sciences faculties (SMU and SCAS) were integrated units that covered essentially all of the basic fields in the geosciences. Thus the SMU Ph.D. program was able to start with real strength in the mid 1960's with a new group of Ph.D. candidates. They formed a diverse and talented group, and Chuck Naeser was prominent among them.

Chuck's dissertation study, under the guidance of Henry Faul, was among the seminal studies on fission track dating of apatite, sphene, zircon, and epidote. Chuck's scientific curiosity and passion and the breadth of training that he received at Dartmouth and SMU prepared him well for a very distinguished career with the United States Geological Survey in Denver and Reston.

Only 15 years after the discovery of fission and less than a decade after the recognition of natural fission tracks in minerals, Chuck pioneered the science of fission track geochronology, and applied it in many diverse ways to solve a variety of worldwide geologic problems.

His nearly three decades of work with the USGS has encom-



On site at the Grand Canyon

passed a wide array of subjects, including the age and thermal history of kimberlites, impact structures, ore deposits, tephra deposits, lavas, plugs, mountain ranges, faults, and plutons, and has resulted in more than 200 published papers.

One might observe that his diversions from the scientific realm have contributed to his geologic success. Chuck is also a garden model railway enthusiast and has constructed a world famous garden. Chuck was the first person to receive the Ph.D. degree in the Geological Sciences from SMU and he has clearly brought distinction, respect, and honor not only to himself but to SMU as well.

### Wendorf on math/science alumni panel

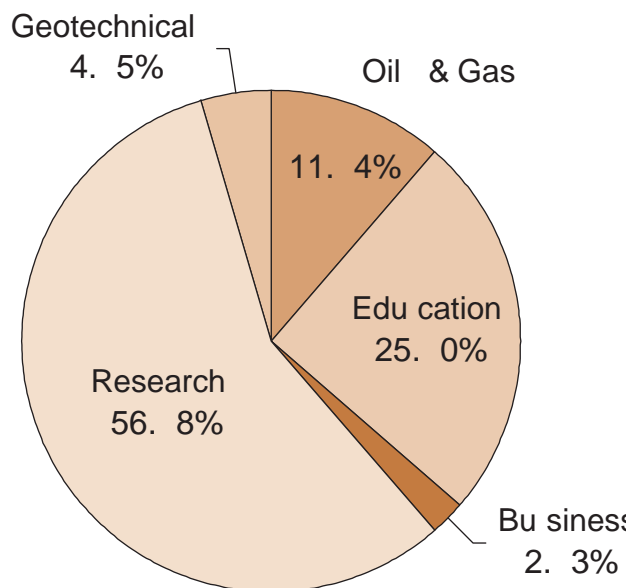
Students looking for jobs and wondering about the potential for jobs in math and science gathered April 10 on the SMU campus to hear from alumni working in the field.

Geology grad Scott Wendorf sat on the panel and shared his career experiences. In 1990 Scott received a B.S. in Geology from SMU and then earned an M.S. from Indiana in 1992.

After working for Shell Oil in New Orleans, Scott returned to law school at the University of Houston. Qualified as a patent attorney, Scott now is practicing intellectual property law

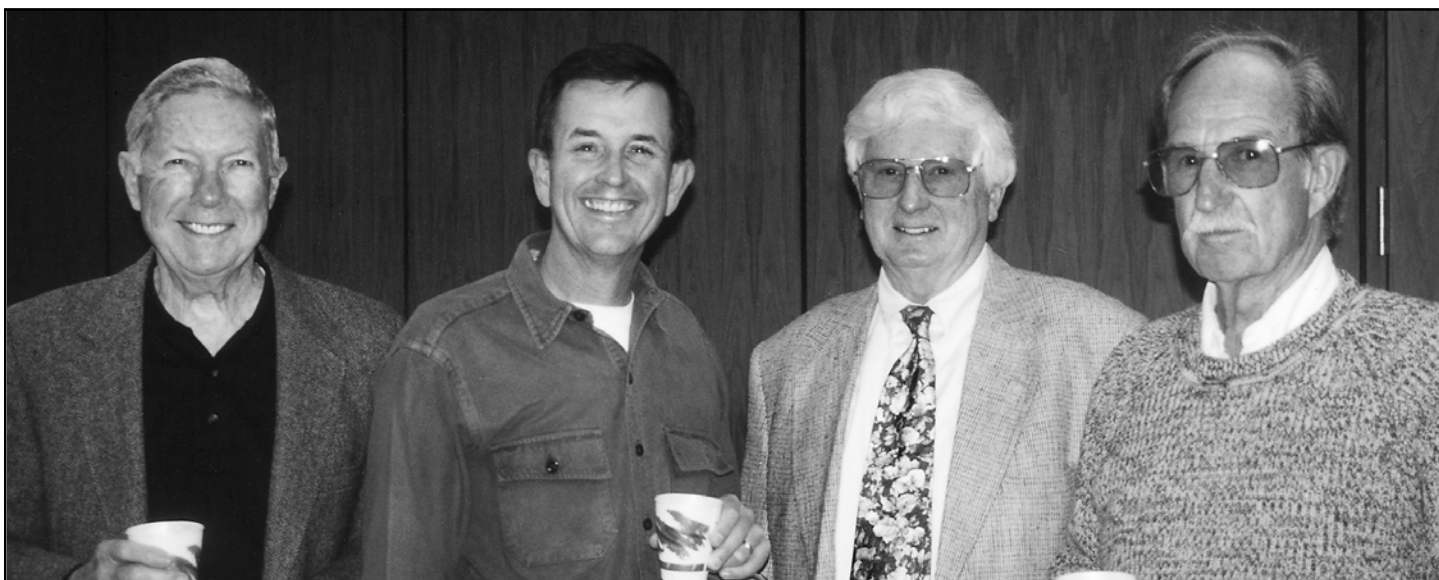


**Scott Wendorf, one of about two percent of Geology graduates who have chosen a career in the field of law.** with the Dallas law firm Baker Botts, L.L.P.



Career paths of Ph.D. respondents 1967-2002. Story on Page 1.





Jack Hamilton, who endowed the scholars program, Professor Brian Stump, "Buck" Wilson, and Professor Eugene Herrin.

## Hamilton scholar Charles "Buck" Wilson brings years of infrasound experience to SMU students

Charles Roland "Buck" Wilson of the University of Alaska was the 2001-02 Hamilton Scholar. Dr. Wilson was on campus the first week in February 2002. Buck is one of the pioneers in the study of infrasound. Infrasound waves are acoustic waves that span the frequency range below human hearing, generally below 20 cycles per second. Many natural phenomena produce infrasound waves that travel great distances through the atmosphere. Buck Wilson spent over 40 years developing techniques for infrasound measurement and has deployed infrasound arrays in Alaska as well as at stations in Antarctica to study the infrasound waves produced by many geologic phenomena.

Being in Alaska, Buck has had the opportunity to study the sound waves produced by the Northern Lights and volcanic eruptions associated with the Aleutian magmatic arc. The auroras produced by the interaction of the solar wind with the Earth's magnetic field generate shock waves in the atmosphere that radiate infrasound

waves. Infrasound is produced by many other natural phenomena including weather systems, earthquakes, landslides, avalanches, ice packs, and meteorite showers.

Infrasound is also useful for detecting bomb blasts. Separating the naturally occurring infrasound from that produced by humans is an important part of the Comprehensive Test Ban Treaty (CTBT) that helps prevent the development of nuclear weapons. Atmospheric tests of nuclear weapons have a strong infrasound signal that can be detected over continental scale distances. U. of Alaska and SMU will deploy four (two each) of the sixty stations in the world-wide infrasound array associated with the CTBT. Infrasound is to the atmosphere as seismology is to the crust so that the new \$100 million worldwide network is the first time that the globe has been wired up to systematically detect infrasound waves. The measurements made on the new network will yield new discoveries about the many phenomena that affect the atmosphere.



Hayward assembling a Linux RAID for data warehousing.

### Dr. Chris Hayward builds computer for storing global seismo-acoustic data

Seismologist at SMU like to work on big problems and big problems mean big datasets. Keeping all the data online, instantly available to researchers and students, allows new ideas to be quickly explored and gives students first hand experience at data analysis. For our global seismo-acoustic signals, students are the first to make significant new observations on these signals. By keeping the data accessible, students spend more time looking at data rather than hours loading backup tapes.

The computer itself is a middle-of-the-road PC system. For seismo-acoustic research, the important parts are the 12, 120 Gbyte disk drives giving a capacity of about 1 Terra byte in a redundant array.

Chris, a staff member in Geological Sciences, earned his Ph.D. from SMU in 1997. He holds B.S. and M.S. degrees from Baylor University. He and his wife Mary Sue live with their dog in the Lakewood neighborhood. Both are avid photographers.

May 18, 2002, graduation exercises

# Geology awards three Ph.D.s, one M.S., and four undergraduate degrees

Graduation is always a special time on campus and this spring was no exception. On Saturday, May 18, the Geological Sciences and Environmental Science programs held commencement activities in the SMU Law Library.

Graduating seniors were Mishty (Gitanjali) Deb, B.S. Environmental Science with Earth Science Emphasis and a B.S. in Economics; Steven Burns, B.S. Geology with a minor in Psychology; Peter Kubik, B.S. in Geology with a minor in Philosophy; Mark Simmons, B.A. in Geology; Rebecca Ghent, Ph.D. in Geology; and Jason Head, Ph.D. in Geology. Also honored at commencement were those students graduating in August 2002. They include, Dana Biasatti, M.S. Geology, and Jason McKenna, Ph.D. in Geophysics.

Special honors went to Leslie Bleamaster and Dr. McKenna, who both received the 2002 Richards-Goodell Award for Excellence in Graduate Student Teaching. Mishty Deb was awarded the 2002 Richards-Goodell Award for Outstanding Undergraduate Student.

Brian Stump announced the newly elected associate members of the Sigma Xi Chapter of SMU, The Scientific Research Society. They are Leslie Bleamaster, Dr. Jason Head and Duncan Young.

The graduate candidates successfully completed their research in several different areas. Dana Biasatti's thesis was entitled *Stable Isotopic Profiles of Sea Turtle Humeri and Epizoic Barnacles and Their Implications for Ecology and Migration Reconstruction*. Dana worked with Louis Jacobs on this project.

Three dissertations were completed by the Geology Ph.D. candidates; Rebecca Ghent, working with Vicki Hansen, wrote *Analysis of Tectonic Structures in Venusian Crustal Plateaus: Structure, Kinematics, and Numerical Modeling*, Jason Head, working with Louis Jacobs, wrote *Snake Paleontology of the Siwalik Group (Miocene of Pakistan): Correlation of a Rich Fossil Record to Environmental Histories*, and Jason McKenna, working with David Blackwell, wrote *Implications of Subduction Zone Thermal Models for Arc-Volcanism and Seismicity: Examples from Cascadia, Southern Mexico, and Northern Costa Rica, and other Geothermal Studies*.

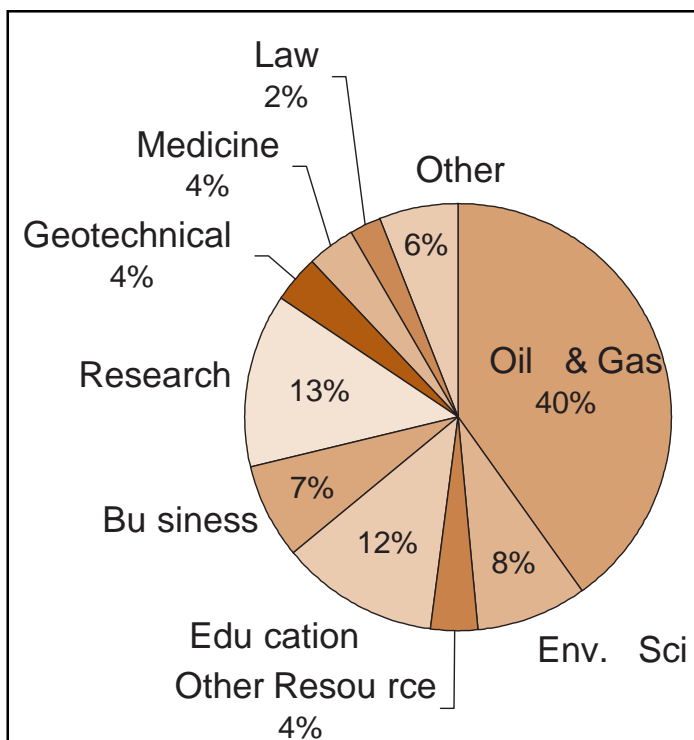
These 2002 candidates are all engaged in productive and exciting new endeavors. Dana Biasatti is continuing her studies at Florida State in Tallahassee, Florida, pursuing a Ph.D. Mishty Deb is enrolled in law school at the University of Texas at Austin. Steven Burns and Peter Kubik are enrolled as graduate students in geology here at SMU, pursuing the M.S. degree. Mark Simmons is teaching earth science in an elementary school in the Dallas Independent School District, Rebecca Ghent and Jason Head, who also happen to be married to one another, both received post-doctoral fellow-



Photo by Chris Hayward

ships in Washington, D.C. Ghent is at the Smithsonian Institution, National Air and Space Museum. Just down the mall, Jason Head is working at the National Natural History Museum.

Jason McKenna has had a reversal of roles. After completing his degree he was appointed Visiting Assistant Professor in the Department of Geological Sciences at SMU. McKenna is teaching 1301 Earth Systems this fall.



This graph illustrates the professions chosen by individuals responding to the survey who earned bachelor's and master's degrees between 1933 and 2002 from SMU. (See story, Page 1.)



**Institute for the Study of Earth and Man**

## Marlan W. Downey wins Hedberg award for 2002

By Louis L. Jacobs  
President, ISEM

The Institute for the Study of Earth and Man (ISEM) is very pleased to announce that Marlan W. Downey will be the recipient of the 2002 Hollis D. Hedberg Award in Energy. This event will be held on Thursday, November 7, at the Dallas Country Club. The Hedberg Award in Energy is presented annually by the ISEM to individuals who have made exceptional contributions to understanding the earth and its resources. The Award pays tribute to the distinguished career of the late Hollis D. Hedberg, a geologist who contributed substantially in such areas as paleontology, sedimentology, geophysics, the geology of source rocks, hydrocarbon exploration, and the history of geology.

Marlan Downey is being recognized for his extraordinary contributions to the energy industry and for his commitment to education and student research. Downey completed his M.S. in Geology at the University of Nebraska in 1957 after which he went to work for Shell Oil Company's research lab in Tulsa. His career at Shell spanned 30 years with his last position as President of Shell's international subsidiary, Pecten International. Later, Downey became President of ARCO International. Immediate past president of the American Association of Petroleum Geologists, he was also Chief Scientist of the Sarkeys Energy Center and the Bartell Professor of Geoscience at the University of Oklahoma. In 2001, Downey organized and chaired the Conference on a National Energy Policy in Washington, D.C. He was recently honored in Houston as "A living Legend in the Oil Business."

While honoring Marlan Downey as this year's winner of the Hollis D. Hedberg Award, the November event ticket sales also benefit student research. The evening's keynote speaker is Simon Winchester, noted author of *The Map That Changed the World: William Smith and the Birth of Modern Geology*.

Please contact the ISEM at 214-768-2425 if you would like an invitation to this event.

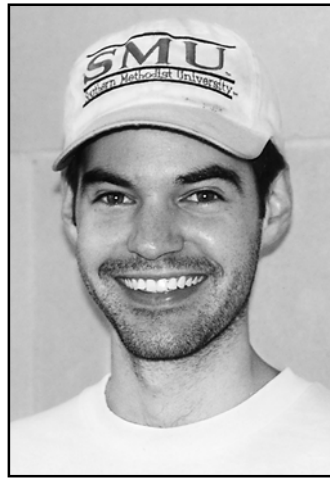
## SMU receives software gift from Seismic Micro-technology

Houston-based Seismic Micro-technology has donated a package of its geoscience software to the Department of Geological Sciences at SMU.

The software, called THE KINGDOM SUITE+, includes a variety of different programs that help geologists interpret seismic data and integrate maps and seismic information.

"This software will give our students access to the types of software they will encounter when they go into industry," said Bob Gregory, chair of the Department of Geological Sciences.

SMU's Department of Geological Sciences offers undergraduate and graduate degrees in geology, geophysics and environmental geology.



Steven Burns

### Midland's home; geology's a natural

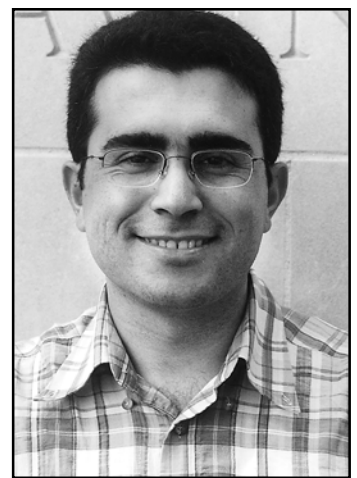
Steven Burns shares his home town with President George W. Bush—Midland, Texas—and not surprisingly comes to Geology with a family background in the oil and gas industry. His father has had a long career in oil exploration.

Three colleges looked good to Steven upon high school graduation: SMU, TCU, and Vanderbilt. SMU prevailed with its outstanding Geology program. Steven graduated in May 2002 with a B.S. in Geology.

While in undergraduate school, Steven worked for David Blackwell as a work-study student. In that capacity he won an award as the "Outstanding Work-Study Student" at SMU.

After surveying job prospects with several independent oil companies over the summer, Steven decided to take their advice and go directly into graduate school to earn his M.S. in Geology. He hopes to concentrate his studies in petroleum geology and find opportunities with internships and special projects with local oil and gas companies.

Steven enjoys running and clay bird shooting. After graduation he took a vacation to Cancun, Mexico, and celebrated on the beach.



Kamil Erkan

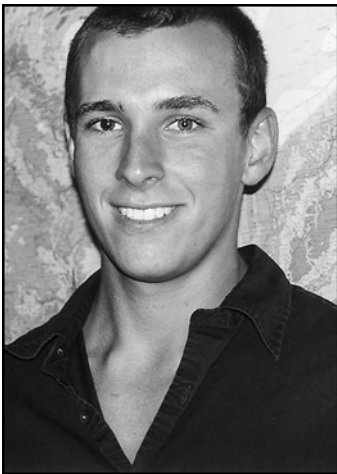
### Native of Turkey studies in Texas

Kamil Erkan is a native of Izmit, Turkey, a town about an hour's drive east of Istanbul. After Izmit was hit by a significant earthquake in 1999, Kamil and his family lived out of doors for one month until they felt safe in moving back indoors.

Kamil's father is a retired high school Arabic language teacher and now translates books into Turkish from Arabic. Kamil, the youngest of four siblings (three sons and a daughter), attended Bilkent University and earned a B.S. and M.S., both in Physics. He is pursuing a PhD in Geophysics and will be working with David Blackwell on geothermal topics.

Kamil and his wife of two years, Emine, are the parents of an eight-month old daughter, Zeynep. The family returned to Turkey this summer for a visit with friends and family. They took a few days to enjoy a beach holiday on the Black Sea in northern Turkey.

Cool evenings and a robust street life are things Kamil misses most about life in Turkey. The Erkan's enjoy Dallas very much, though, and live in the Village Apartments. They appreciate the beauty of the complex's landscape. Kamil particularly enjoys driving on the well-maintained highway system in the U.S.

**Peter Kubik**

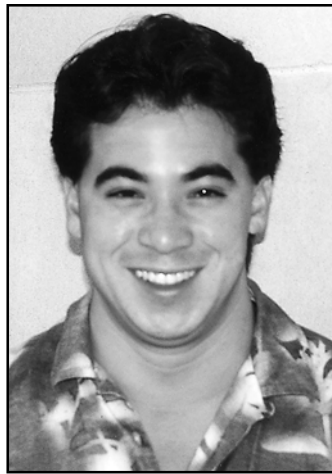
## Born in Poland, raised in the USA

Peter Kubik comes to the Geology graduate program with a love of both language (fluent in Polish) and geology. He was born in Warsaw, Poland, in 1979. His strong Polish stock is suggested by the fact that after Peter was born in the morning, his mother, a medical student, got up that very afternoon and took a medical exam.

Since Poland then was under communist control, his parents decided to immigrate to the U.S., settling in Buffalo, New York, when Peter was three months old. The family later relocated to Florida, where Peter and his brother Paul grew up.

After completing high school, Peter was primarily interested in two universities—Loyola in Chicago and SMU. Loyola had the draw of a large Polish community with language study opportunities, but SMU won out with its diverse opportunities in the liberal arts and sciences.

Graduating with a B.S. in Geology (with a minor in Philosophy) in May 2002, Peter decided that it was a good time to pursue the M.S. in Geology. He will focus his studies in petroleum geology. An outdoor enthusiast, he enjoys mountain biking, sailing, and travel, and he plays hockey for a local team.

**Aaron Pan**

## Panhandle's Pan educated in CA

A new marriage and a new graduate program should keep Aaron Pan busy in his first year at SMU. Aaron and his bride, Jennifer (both from Amarillo), moved to Dallas after completing their undergraduate educations in California.

Aaron will be studying with Bonnie Jacobs as he pursues his M.S. degree. Biology, with Paleobotany, was Aaron's area of study at University of California at Santa Barbara.

Born in hilly San Francisco, Aaron quickly moved to the flat and straight streets of Amarillo. Aaron's father is a radiologist and his mother is a homemaker.

When researching graduate programs, Aaron considered four major institutions, University of Florida, Texas A & M, University of Michigan and SMU. He chose SMU and will have the opportunity to travel with Jacobs in December, 2002, to Ethiopia for a three-week trip to study fossil plants.

Not surprisingly, his hobbies include growing plants. He is nurturing a Hawaiian plant named *Brighamia*. The Pan household also includes an interesting assortment of small animals—five frog-eyed geckos (three adults and two babies), two African dormice, and one dwarf hamster.

**Evelyn Tension**

## Oklahoma native pursuing Ph.D.

A native of Paul's Valley, Oklahoma, Evelyn Tension is pursuing a Ph.D. in Geology. Evelyn recently completed an M.S. in Geology at the University of Texas at Arlington, and prior to that earned a B.S. degree at the University of Texas at San Antonio, also in Geology.

As a graduate student, Evelyn's teaching assistant responsibilities will include working in the lab for Bob Gregory's course, Earth Materials I. Embarking on her academic career as a "returning student" after raising three children (all grown now, two girls and a boy), Evelyn is enthusiastic about hard rock petrology and collects rocks whenever she is on the road. Her new husband of two months, Raul Rangel, kindly acts as "mule" to bring her rocks safely back home.

Evelyn hopes to pursue her interest in igneous rocks. Arlington, Texas, is home to Evelyn and Raul and their three cats—Miss Kitty, Gato, and Lucy, who add spice to their domestic life. Evelyn has recently become a third-time grandmother; she will have a busy fall semester here at SMU. Hobbies include hiking, camping, and traveling out west to see geology in action. Evelyn enjoys running and has successfully completed a marathon.

## World-class scientists to give special lectures

Two renowned scientists will speak as part of the *Environmental Science Program (ESP) Lecture Series*. Dr. **Eva Oberdörster** will talk on Oct. 3, at 4:00 pm in Room 131 of the Dedman Life Sciences Building (DLSB). Her talk is "Where's the beef? Egg yolk is induced in turtle and fish by estrogen in runoff from beef farms."

Dr. **Peter Crane**, Director, Royal Botanic Gardens, Kew, speaks on Nov. 8, 11:00 am, Room 110 of DLSB. Topic is "Exploring the World of Plants: Unfinished Business." For further information contact Dr. Bonnie Jacobs at [bjacobs@mail.smu.edu](mailto:bjacobs@mail.smu.edu) or visit the web at [www.smu.edu/esp](http://www.smu.edu/esp).

### SMU alumni news

**Barbara Dutro** (Ph.D., '85) has recently been promoted from associate professor to full professor at Louisiana State University.

**Roger Nielsen** (Ph.D., '83) is a full professor at Oregon State University and will assume the chairmanship of the 22-member faculty of Geosciences in July, 2003.

**Mike Shields** (Ph.D., '94) lives in Calgary where he works as an exploration geologist. Recent years have involved international projects in Yemen, Australia and Indonesia.

**David Robertson** (M.S., '93) works as an enforcement officer for the EPA. He conducts inspections of industrial facilities for compliance with the Resource Conservation & Recovery Act.

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## GEOLOGICAL SCIENCES FACULTY, SOUTHERN METHODIST UNIVERSITY

**David D. Blackwell**, Hamilton Professor, Ph.D., Harvard. Geothermal studies and their application to plate tectonics, especially of the western United States; energy resource estimates and geothermal exploration.

**Robert T. Gregory**, Professor, Chair, Ph.D., California Institute of Technology. Stable isotope geology and geochemistry, evolution of earth's fluid envelope and lithosphere.

**Eugene T. Herrin**, Shuler-Foscue Professor, Ph.D., Harvard. Theoretical and applied seismology, solid earth properties, computer analysis of geophysical data.

**Louis L. Jacobs**, Professor, Ph.D., University of Arizona. President of the Institute for the Study of Earth and Man. Vertebrate paleontology, evolution.

**A. Lee McAlester**, Professor, Ph.D., Yale University. Marine ecology-paleoecology, evolutionary theory, Paleozoic geology, petroleum geology.

**Jason R. McKenna**, Visiting Assistant Professor, Ph.D., Southern Methodist University. Thermal-mechanical evolution of subduction zones and plate geodynamics, thermal regime of oil/gas fields.

**Brian W. Stump**, Albritton Professor, Ph.D., University of California, Berkeley. Seismology, earthquake and explosion source theory, regional wave propagation, seismic and infrasonic instrumentation and data acquisition, and mine-related seismicity.

**John V. Walther**, Matthews Professor, Ph.D., University of California, Berkeley. Experimental and theoretical aqueous geochem-

istry, fluid-mineral surface interactions, kinetics of dissolution, and mineral solubilities as a function of temperature, pressure and solution composition.

**Crayton J. Yapp**, Professor, Ph.D., California Institute of Technology. Stable isotope geochemistry applied to the study of paleoclimates, paleoatmospheres, and the hydrologic cycle.

### ADJUNCT FACULTY

**Steve Bergman**, Adjunct Assistant Professor, Ph.D., Princeton University. Tectonics of sedimentary basins, surface processes, volcanology, geochronology and hard rock petrology.

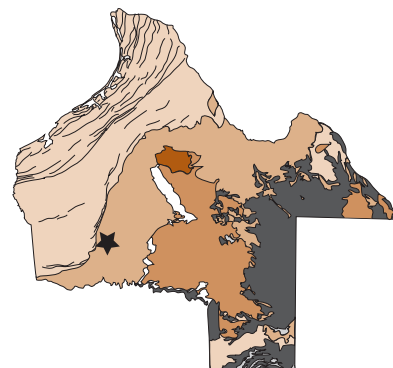
**Anthony Fiorillo**, Research Associate Professor, Ph.D., Pennsylvania. Curator of Paleontology, Dallas Museum of Natural History.

**Bonnie F. Jacobs**, Adjunct Assistant Professor and Chairman of the Environmental Science Program, Dedman College. Ph.D., University of Arizona. Paleobotany of Tertiary deposits of Africa, application of pollen analysis to Cenozoic geological and environmental Problems.

**Douglas H. Oliver**, Research Assistant Professor, Ph.D., Southern Methodist University. Structural geology, tectonics, and economic geology.

**Alisa J. Winkler**, Research Associate Professor, Ph.D., Southern Methodist University. Mammalian paleontology, anatomy.

**Dale A. Winkler**, Adjunct Associate Professor and Director, Shuler Museum of Paleontology, Ph.D., University of Texas at Austin. Paleontology, paleoecology.



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